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Assistant Commissioner for Patents  
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Sir:

Transmitted herewith for filing is the patent application of  
Inventor(s): BEOM, Jae Young

For: DEVICE AND METHOD FOR FILTERING ADDED INFORMATION

Enclosed are:

- X A specification consisting of 17 pages
- X 4 sheet(s) of Formal drawings
- X An assignment of the invention
- X Certified copy of Priority Document(s)
- X Executed Declaration X Original      Photocopy
- A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27
- Preliminary Amendment
- X Information Disclosure Statement, PTO-1449 and reference(s)

Other \_\_\_\_\_

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Respectfully submitted,

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# DEVICE AND METHOD FOR FILTERING ADDED INFORMATION

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to a MPEG-2 transport decoder, and more particularly, to device and method for filtering added information, in which PSI(Program Specification Information) in a transport stream is processed in an MPEG-2 system layer.

### Background of the Related Art

The MPEG-2, widely known as a moving picture compression method, has standards on a system layer for compression of an audio data, in addition to the moving picture data, and changing the moving picture data and the audio data suitable for transmission. The system layer has two systems, one is a TS(Transport Stream), and the other is a PS(Program Stream). While the PS system forms a pack by grouping a plurality of PES(Packetized Elementary Stream), reversely the TS system divides the PES for loading on a plurality of transport packets before transmission. That is, since the TS system transmits a plurality of video and audio individual bitstreams, the TS system requires information on selection of a program from a plurality of programs, and on selection of a packet, and on how to decode the packet, that is called as PSI(Program Specification Information). The PSI is transmitted by a packet having identification codes or a packet indicated by a primary PSI. In the MPEG-2 system layer, the PSI is one of element in the TS. In decoding and reproduction of the TS, one of the plurality of programs should be selected, and PIDs(Packet IDentification numbers) of the transport packets of the individual bitstreams required for the decoding and reproduction of the program should be known. Then, parameter information or linkage information of the individual bitstreams should be known. In order to conduct the foregoing multistage operation, a plurality of added information tables are required, which are transmitted by a data structure called as sections. Of

the plurality of tables, PAT(Program Association Table) is special information transmitted by a packet with PID=0. Every program number in the PAT has a description on elements of a relevant program, and particularly, has a PID of the transport packet which transmits a PMT(Program Map Table). The PMT describes a program PID, and a PID list and annex information of a transport packet which transmits individual video and audio bitstreams. In this instance, different from the PES which deals with ES(Elementary Stream), coded video or audio data, the PSI is provided with a redundancy for making fast access available since the PSI includes information on the program. That is, the PSI has identical information repeatedly for quick starting of decoding at any time. For example, standards of the ATSC(Advanced Television Systems Committee) requires transmission of information on PAT within at least 0.1 seconds, and on PMT within 0.4 seconds. That is, if the PAT is not available, there can be a problem in decoding since the information can not be identified as being a video or an audio. However, because there is no change in the information in most of the cases, information identical to the one transmitted before is transmitted. Accordingly, a general transport decoder has an algorithm for effective processing of such repeated data, one of which known widely is the section filtering defined in a DVB(Digital Video Broadcasting) standard. That is, the MPEG-2 has standards for four PSI tables each having a basic unit called a section, a combination of which forms one table. Information may be transmitted, with the information put in one section or a plurality of sections.

The sections have syntaxes of similar formats for convenience of hardware or software, of which, the following is a private section syntax.

```
private_section( ) {  
    table_id
```



In the section filtering, a filter is provided for several initial data bytes in a section for processing only sections each having a data at a particular position in the section which has the same value with a preset value. That is, a match data and a mask byte(or bit) are set up for data bytes at filtering positions, so that masked data only are compared to the match data, for storage in a designated position only when the masked data is the same with the match data.

FIG. 1 illustrates one example of an 8 byte section filter, wherein, in a case mask bit is '1', a section data of a corresponding byte(or bit) is compared to a match data, for processing only sections which is the same. 'A' type section filter in FIG. 1 illustrates a case when the mask is set up in bit units, and 'B' type section filter in FIG. 1 illustrates a case when the mask is set up in byte units. For example, it can be known that a comparison of data in the section 'A' in (a) in FIG. 1 to the match data in the 'A' type section filter with a mask bit of '1' in (c) is turned out that the two data are the same. In this case it is determined that the two data are matched, and the data in the section 'A' is received and stored in a designated position. In this instance, since the data in the section 'A' and the match data in the 'B' type sector filter with a mask byte of '1' in (d) are not the same, the B type section filter does not receive the data in the section A. That is, it can be known that the section A in (a) and the A type section filter in (c) are matched, and the section B in (b) and the B type section filter in (d) are matched. Of PSI sections processed and transmitted thus, a desired PSI can be selected and processed. In fact, a DVB standard requires at least 32 section filters each with at least 8 bytes.

However, because such a section filtering requires a large amount of hardware, and a host sets up the filter directly, load on the host is great, and the host may miss sections to be processed or waste the filter due to a time period required for doing this. That is, since unnecessary

portions of data, such as on section\_lengths, unused bits, and etc., in FIG. 1 are masked for comparison, wastes of the hardware are resulted in.

### SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to device and method for filtering added  
5 information that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide device and method for filtering added information, which can reduce a size of hardware.

Another object of the present invention is to provide device and method for filtering  
10 added information, which has an effective system.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as  
15 well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the device for filtering added information includes a memory for storing table IDs and version numbers of sections for each of the table IDs, a combination of at least one of the sections forming a table which added information defines, a  
20 comparing unit for determining match of a table ID included in the section and the table IDs stored in the memory upon reception of the section, and comparing the version number of the matched table ID to the version number of a received section number, and a section processing unit for receiving, and processing the present section if it is determined that the version number



stored in the table ID the same with the table ID of the section received from the comparing unit is not the same with the version number of the received section.

The section processing unit skips the section received at the present time if it is determined at the comparing unit that no table IDs are in match, or the version number stored in the matched table ID is the same with the version number of the received section.

The section processing unit automatically sets up a version value stored in the memory with a new version number when a section with a new version is received.

If it is determined that the table ID of the section received from the comparing unit presently is in match with the table ID stored in the memory, the section processing unit determines completion of the table of the version processed presently, and mask enables the version number of the section if it is determined that the table is completed.

The section processing unit skips the section received at the present time if the version number of the section received at the present time is mask enabled.

In another aspect of the present invention, there is provided a method for filtering added information for receiving only required sections using a memory for storing table IDs and a memory for storing version numbers of the sections separate for each of the table IDs, including the steps of (1) upon reception of the section, determining match of the table ID included in the section and the table IDs stored in the memory, (2) if it is determined in the step (1) that there are the table IDs matched, determining the version number included in the received section of being the same with the version number stored in a version memory of the table ID, and (3) if it is determined in the step (2) that the two version numbers are not the same, receiving and processing the present section.

The method further including the step of skipping the section received at the present time

if it is determined in the step (1) that there are no table IDs matched, or if it is determined in the step (2) that the two version numbers are the same.

The step of skipping the section is caused when the version number of the section received at the present time is mask enabled.

5 The method further including the steps of (6-1) determining completion of the table of the version processed at the present time, if it is determined in the step (1) that the table ID of the section received at the present time and the any one of table IDs stored in the memory are matched, and (6-1) mask enabling the version number of the section if it is determined in the (6-1) step that the table is completed.

10 The step (3) further includes the step of automatically updating the version value stored in the version memory with a new version number upon reception of a section having the new version.

15 It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention:

In the drawings:

FIG. 1 illustrates an example of a related art section filter;

FIG. 2 illustrates a system of a hardware basis embodiment of a method for filtering

added information in accordance with a preferred embodiment of the present invention;

FIG. 3 illustrates a flow chart showing a method for filtering added information in accordance with a first preferred embodiment of the present invention; and,

FIG. 4 illustrates a flow chart showing a method for filtering added information in accordance with a second preferred embodiment of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Device and method for filtering added information of the present invention suggests application of only table IDs and version numbers to a filter for reducing a size and complexity of hardware, particularly memories. The table IDs are assigned to every table, and are included in every section. The device and method for filtering added information of the present invention also suggests to receives a data which has the same table ID, but different version number. FIG. 2 illustrates a system of hardware basis embodiment of a method for filtering added information in accordance with a preferred embodiment of the present invention, and FIG. 3 illustrates a flow chart showing a method for filtering added information in accordance with a first preferred embodiment of the present invention, schematically.

Referring to FIG 2, the system includes a table ID memory 22 for storing table IDs of sections, and a memory 21 for masking enable bits E for each table ID and versions to be masked. If a section 20 is received, a start of the section is searched for(S 301). If a payload unit\_start\_indicator is '1' in a TS packet having a PSI payload, the start of the section can be known from a pointer field. And, another section is started if the next data is not 0xFF after one section is ended. In this instance, a first byte of the section 20 is the table ID. Therefore, the

table ID is compared to the table IDs stored in the table ID memory 22 .(S302) If there is a table ID matched, a version number assigned to the matched table ID is read from the version memory 21 for the table ID, if not, the present section is skipped. In the meantime, if there is a matched table ID, a masking enable signal 'E' is determined of being '1'. If the masking enable signal 'E' is '1', a version number in the section is compared to a version number in the version memory 21.(S 303) If the version of the present section is the same with the version in the version memory 21, and in a state of mask enable, the present version is masked. That is, the same data is received and stored, already. Therefore, in this instance, the present data is skipped(S 304). The masking enable signal 'E' is a flag for determining storage of the received section. If the present section in the step 303 is different from the version in the version memory 21 and there is no mask enable signal, the present section is either stored or processed(S 305).

FIG. 4 illustrates a flow chart showing a method for filtering added information in accordance with a second preferred embodiment of the present invention, wherein a start of a received section is searched for in the same method with the one shown in FIG. 3(S 401). Once the start of the section is found in the step 401, match of the table ID in the section and the table ID in the memory 22 is determined(S402). If it is found in the step S 402 that the two table IDs are in match, the version number stored in the version memory of the table ID and the version number of the section are compared(S 403). If it is found in the S 403 that the version of the present section is the same with the version in the version memory 21, and the mask enable bit 'E' is '1', the present section is skipped(S 404) as the present version is masked(S404). If it is found in the S403 that the version of the present section is different from the version in the version memory 21, and it is not in a mask enable state, the present section is stored or processed (S405). In the meantime, if it is determined in the S402 that the table IDs are in match,

completion of one table is determined(S406). The table is deemed completed if all sections of the table for the version processed presently is processed or no more sections are required. That is, completion of the table is verified on reception of section\_number and last\_section\_number from the received section. If it is determined in the S406 that the table is completed, a table completion bit 'C' of the table is set to '1', and if a version number automatic setting bit 'A' is '1', a received version number is stored in the version memory 21. The table completion bit 'C' is a flag set automatically for not processing the same sections of the version received after all the sections of one version is processed. And, the version number automatic setting bit 'A' is a flag for automatic updating of the version stored in the version memory to a new version when sections of a new version is received. That is, if it is intended to store a received version number in the memory 21, the version number is stored after the mask enable bit 'E' is set to '1' if the table completion bit 'C' is '1'.

The present invention suggests no algorithm for checking completion of the table. However, if the table has only one section, i.e., last\_section\_number is 0x00, the table can be provided with easy as the table is completed if the section received presently is processed. And, the present invention provides a flag which updates the version memory to a new version value upon reception of a new version, so that a rapid change of the version can be dealt with without participation of the host.

As has been described, the present invention can reduce hardware significantly in comparison to the related art section filtering. For example, sizes of a related art 8 byte section filter and a memory of the present invention are compared as follows.

If there are N section filters, the related art memory size M\_sec is

$$M\_sec = N \times 8\text{bytes} \times 2 = 128N.$$

If N table IDs are version masked in the present invention, the memory size M<sub>ver</sub> is

$$M_{\text{ver}} = N \times 8\text{bits} \times 2 = 16N.$$

That is, it can be known that the size of the memory is reduced to 1/8. And, as the present invention can automatically set a version to be masked from the hardware, the sections can be processed without missing any section regardless of a performance of the host even if updated sections are received continuously. For example, it is assumed that there are three sections with version numbers 0x00, 0x01, 0x02 under the same table ID, and each of the sections forms one table. When sections with version numbers 0x00 are received continuously, then one section with version number 0x01 is received, and, in succession, sections with version numbers 0x02 are received continuously, a procedure for processing the three versions will be described.

In a case of the related art section filtering, the host set the filter such that the sections with version numbers 0x00 are processed at first, and then the section with version number 0x01 is processed. And, upon reception of the section with the version number 0x01, the section is stored through the filter. The host sets the filter such that the stored section is read and decoded, and, then, the sections with version numbers 0x02 are processed. However, in the aforementioned case, the long time period required for setting the filter for processing the sections with version numbers 0x02 may lead to miss a first section of the version number 0x02. However, since the present invention suggests to mask the section with version number 0x01 at the hardware as soon as the section with version number 0x01 is received, the next sections with version numbers 0x02 can be processed without missing any of the sections with version numbers 0x02.

Such a difference comes from the design of the related art section filtering in which required sections are selected, while the version masking of the present invention is designed to

abandon unnecessary sections. Since the present invention permits to process MPEG PSI effectively without employing 32 filters, the present invention can be applied to a transport decoder which uses an MPEG TS as a system layer. And, the application of the present invention to a system information field in other system layers permits reduction of hardware or intellectual  
5 decoding without participation of the host.

As has been explained, by applying the filter only to particular positions with great importance (table ID, version number) instead of general filtering, device and method for filtering added information of the present invention can reduce a size and complexity of hardware, i.e., memories, and by abandoning unnecessary sections instead of selecting required sections, an  
10 effective system can be provided, and missing sections which should be processed or wasting of the filter due to a time period required for setting the filter can be prevented. And, because reception of sections to the transport decoder is determined for reception of necessary sections only and abandoning unnecessary sections, which lessen a load on the host, a performance of the host can be improved.

15 It will be apparent to those skilled in the art that various modifications and variations can be made in the device and method for filtering added information of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is Claimed is:

1. A device for filtering added information comprising:

a memory for storing table IDs and version numbers of sections for each of the table IDs,  
a combination of at least one of the sections forming a table which added information defines;

5 a comparing unit for determining match of a table ID included in the section and the table  
IDs stored in the memory upon reception of the section, and comparing the version number of  
the matched table ID to the version number of a received section number; and,

10 a section processing unit for receiving, and processing the present section if it is  
determined that the version number stored in the table ID the same with the table ID of the  
section received from the comparing unit is not the same with the version number of the received  
section.

15 2. A device as claimed in claim 1, wherein the section processing unit skips the section  
received at the present time if it is determined at the comparing unit that no table IDs are in  
match, or the version number stored in the matched table ID is the same with the version number  
of the received section.

3. A device as claimed in claim 1, wherein the section processing unit automatically sets  
up a version value stored in the memory with a new version number when a section with a new  
version is received.

20 4. A device as claimed in claim 1, wherein, if it is determined that the table ID of the  
section received from the comparing unit presently is in match with the table ID stored in the



memory, the section processing unit determines completion of the table of the version processed presently, and mask enables the version number of the section if it is determined that the table is completed.

5 A device as claimed in claim 4, wherein the section processing unit skips the section received at the present time if the version number of the section received at the present time is mask enabled.

6. A method for filtering added information for receiving only required sections using a memory for storing table IDs and a memory for storing version numbers of the sections separate for each of the table IDs, comprising the steps of:

10 (1) upon reception of the section, determining match of the table ID included in the section and the table IDs stored in the memory;

(2) if it is determined in the step (1) that there are the table IDs matched, determining the version number included in the received section of being the same with the version number stored in a version memory of the table ID; and,

15 (3) if it is determined in the step (2) that the two version numbers are not the same, receiving and processing the present section.

7. A method as claimed in claim 6, further comprising the step of skipping the section received at the present time if it is determined in the step (1) that there are no table IDs matched, or if it is determined in the step (2) that the two version numbers are the same.

8. A method as claimed in claim 7, wherein the step of skipping the section is caused when the version number of the section received at the present time is mask enabled.

9. A method as claimed in claim 6, further comprising the steps of;

(6-1) determining completion of the table of the version processed at the present time, if it is determined in the step (1) that the table ID of the section received at the present time and the any one of table IDs stored in the memory are matched, and

(6-1) mask enabling the version number of the section if it is determined in the (6-1) step that the table is completed.

10. A method as claimed in claim 6, wherein the step (1) further includes the step of determining starting of the received section with reference to a pointer field if a payload\_syntax \_indicator is '1' in a transport packet before the step of determining match of the table ID included in the section and the table IDs stored in the memory.

11. A method as claimed in claim 6, wherein the step (1) further includes the step of determining starting of another section if the next data is not 0×FF after the section comes to an end before the step of determining match of the table ID included in the section and the table IDs stored in the memory.

12. A method as claimed in claim 6, wherein the step (3) further includes the step of automatically updating the version value stored in the version memory with a new version number upon reception of a section having the new version.

## ABSTRACT

Device and method for filtering added information, in which PSI(Program Specification Information) in a transport stream is processed in an MPEG-2 system layer, the device including a memory for storing table IDs and version numbers of sections for each of the table IDs, a combination of at least one of the sections forming a table which added information defines, a comparing unit for determining match of a table ID included in the section and the table IDs stored in the memory upon reception of the section, and comparing the version number of the matched table ID to the version number of a received section number, and a section processing unit for receiving, and processing the present section if it is determined that the version number stored in the table ID the same with the table ID of the section received from the comparing unit is not the same with the version number of the received section, whereby reducing a size and complexity of hardware, i.e., memories, providing an effective system by abandoning unnecessary sections instead of selecting required sections, and preventing missing sections which should be processed or wasting of the filter due to a time period required for setting the filter.

FIG.1  
Background Art

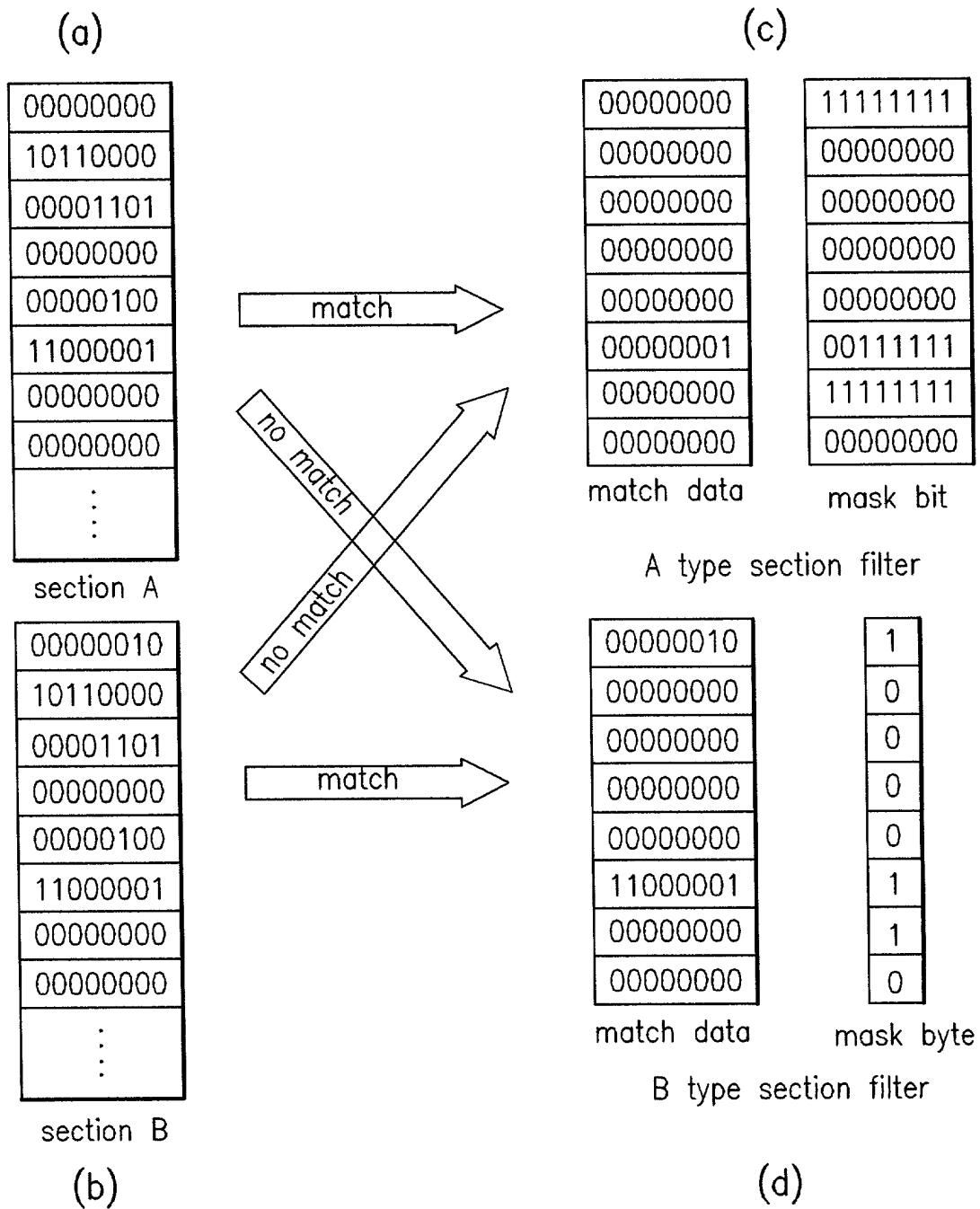
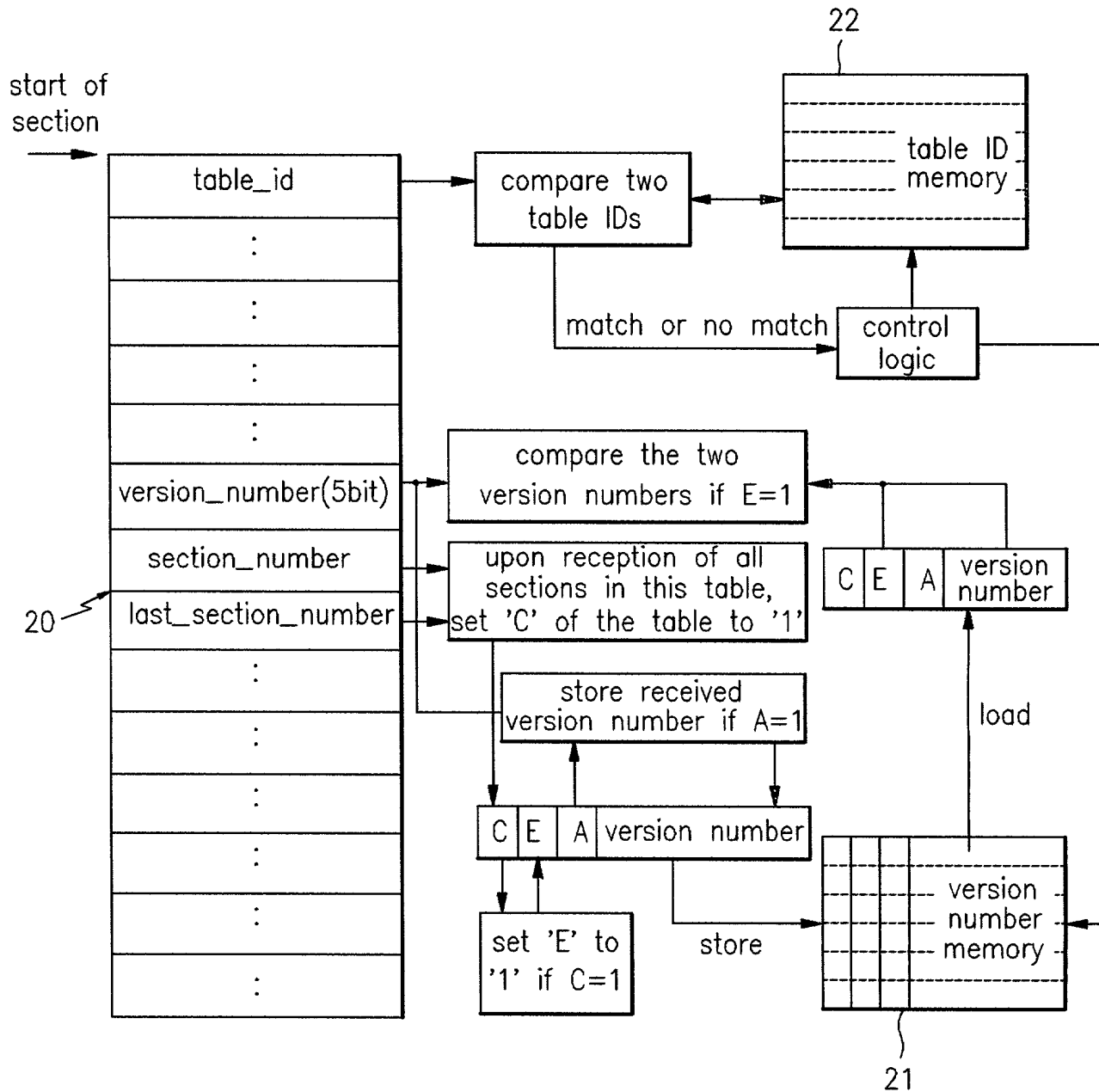


FIG.2



A:automatic setting of version number  
 C:completion of table  
 E:masking enable

FIG.3

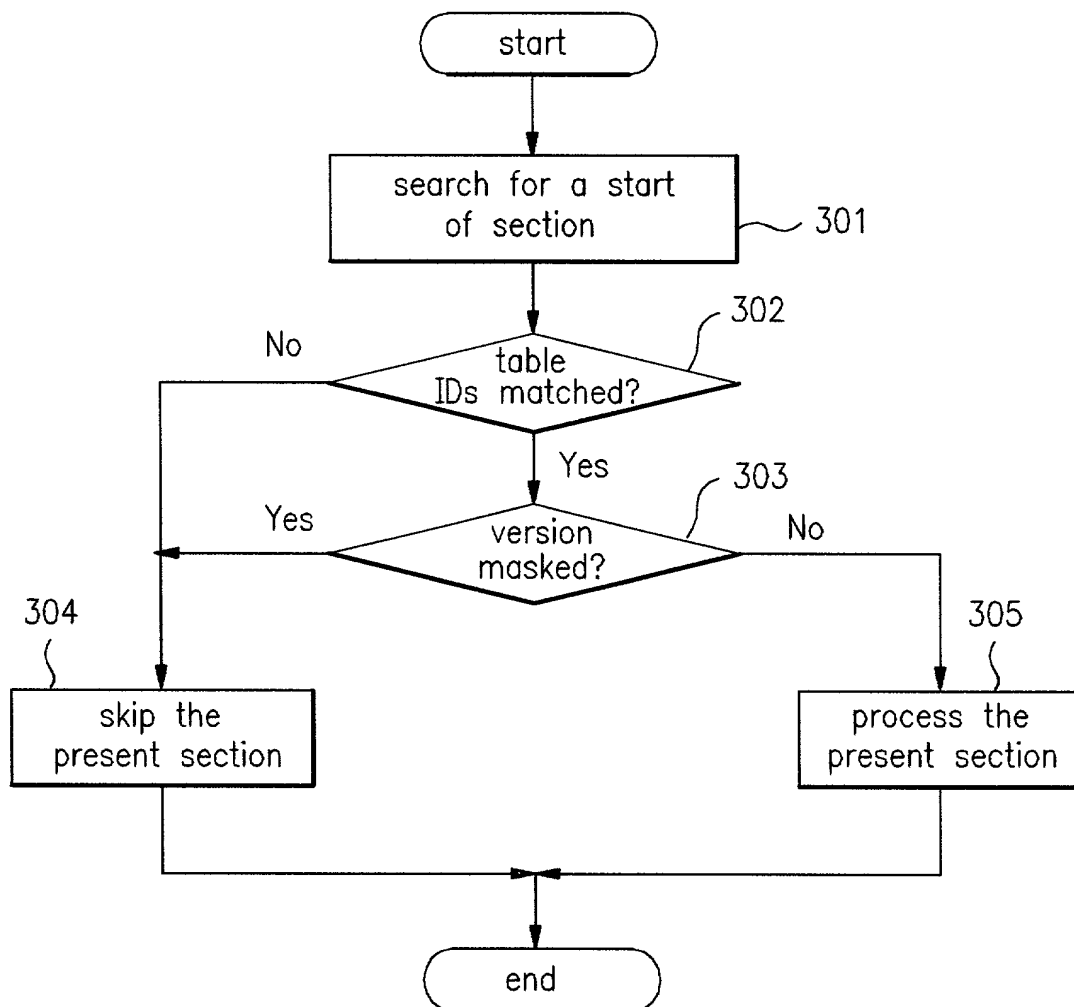
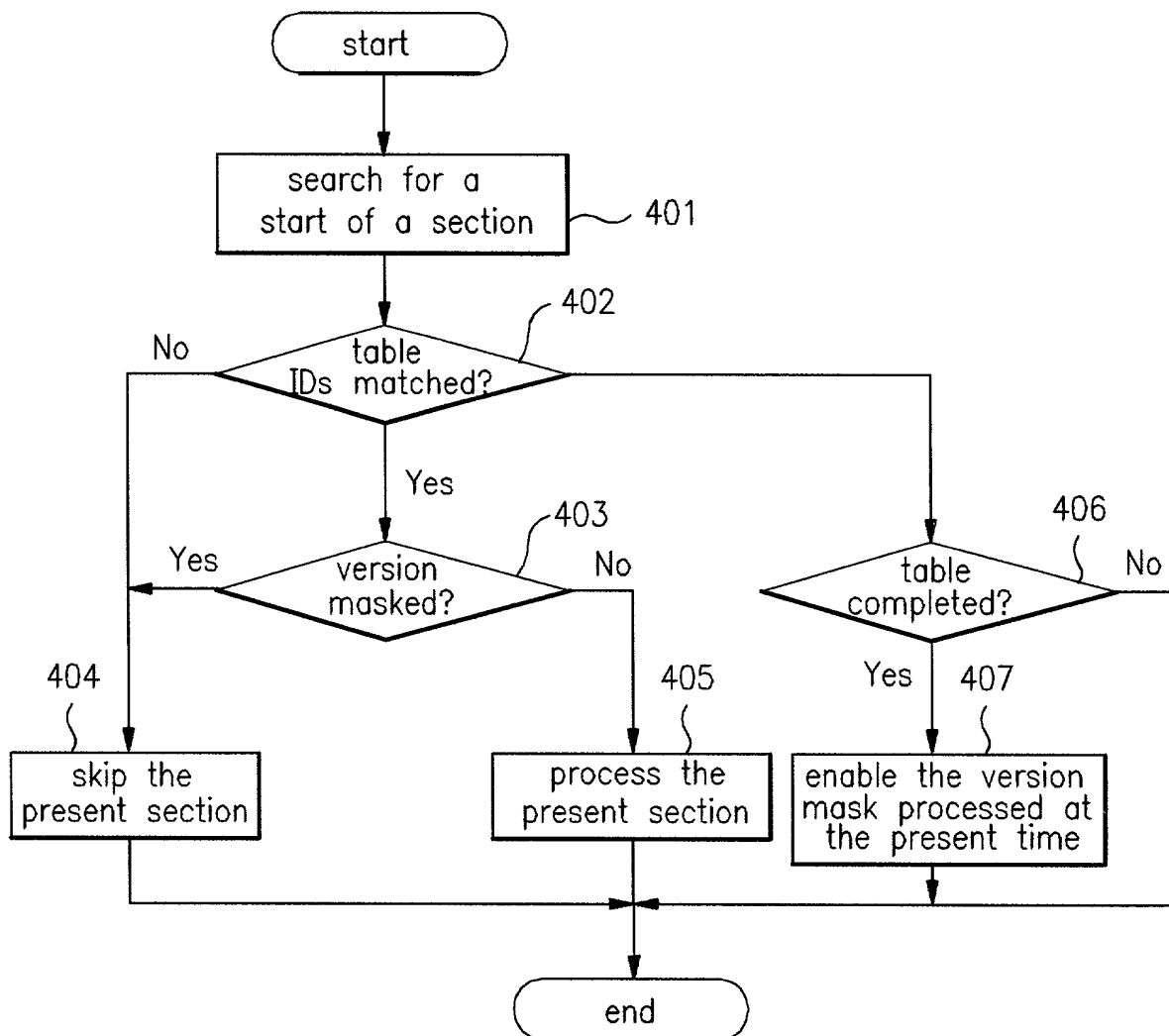


FIG.4



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As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title:

DEVICE AND METHOD FOR FILTERING ADDED INFORMATION

Fill in Appropriate  
Information -  
For Use Without  
Specification  
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I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

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Information:  
(if appropriate)

Prior Foreign Application(s)

859/1999

(Number)

Korea

(Country)

January 14, 1999

(Month/Day/Year Filed)

Priority Claimed

☒ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

Insert Provisional  
Application(s):  
(if any)

(Application Number)

(Filing Date)

(Application Number)

(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More Than 12 Months (6 Months for Designs) Prior To The Filing Date of This Application:

Insert Requested  
Information:  
(if appropriate)

Country

Application No

Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Insert Prior U.S.  
Application(s):  
(if any)

(Application Number)

(Filing Date)

(Status - patented, pending, abandoned)

(Application Number)

(Filing Date)

(Status - patented, pending, abandoned)



I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

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PLEASE NOTE:  
YOU MUST  
COMPLETE THE  
FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole  
Inventor:  
Insert Name of Inventor  
Insert Date This  
Document is Signed

Insert Residence  
Insert Citizenship

Insert Post Office  
Address

Full Name of Second  
Inventor, if any:

see above

Full Name of Third  
Inventor, if any

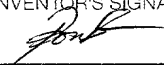
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Full Name of Fourth  
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GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
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GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			

\* DATE OF SIGNATURE